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ABSTRACT

The Assessments of Performance in Teaching (APT) is a classroom teacher performance evaluation procedure mandated by the South Carolina legislature for all student and first year teachers. Aiming to measure minimal competence, the instrument addresses five performance dimensions: planning, instruction, class management, communication, and attitude. Over 1600 teachers were observed 3 times and rated on the 5 performance dimensions with from 8 to 11 indicators each. Objectivity has been substantiated using three observers with the same teaching demonstration. Internal consistency is high and performance dimension correlations with the total instrument score are all significant. Construct validity studies indicate that the APT is useful for multidimensional assessment of teacher skills and behavior. A latent trait analysis of these data suggests an overall unidimensional series. The tentative standards used for research purposes indicate that approximately 10 percent of the sample teachers would not be considered minimally competent. These findings will be used to design the final version of the APT to be implemented in July 1982. (PN)

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PROCEDURE AND RESULTS OF MEASUREMENT IN THE SOUTH CAROLINA ASSESSMENTS OF PERFORMANCE IN TEACHING

by

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RELIABILITY AND VALIDITY STUDIES OF THE ASSESSMENTS OF PERFORMANCE IN TEACHING

Background

On July 1, 1982, South Carolina will begin using a classroom observational instrument for the evaluation of all beginning and student teachers. The instrument under development is called the Assessments of Performance in Teaching or APT. This paper summarizes the developmental process and the interim results found in the field study conducted during 1981. While final revisions are to be made in the spring of 1982 based on these studies, the field study version of the APT Instrument is presented here to stimulate critical analysis of the development of an observational teacher evaluation measure.

The Evaluation Instrument

A classroom observational instrument, the Assessments of Performance in Teaching(APT), was designed to measure minimal teaching competencies. The purpose of the APT Instrument is to assess teaching competencies so that the results can be used to make employment decisions for first year teachers and to propose remediation for student and first year teachers. The APT Instrument is being developed by the South Carolina Educator Improvement Task Force to meet the requirements of Act 187 of the 1979 General Assembly, calling for a teaching performance evaluation.

The APT Field Study Instrument (Appendix) identifies five performance dimensions each of which must be successfully demonstrated to observers during a total of three class periods. The performance dimensions(PD's) are assessed by a total of 51 items (8 to 11 observation statements per PD) through dichotomous(yes/no) ratings of the observers. Tentative standards were set during the pilot study for

field test purposes, however, final standards will be established in the spring of 1982 after analysis of these data.

All observers who use the instrument are required to successfully complete a reliability training program. Information necessary for administering this instrument has been integrated into a 20 to 24-hour training program. The administration procedures are demonstrated and practiced during this training program for observers. To administer the APT Instrument, observers record observations of a planning sheet prepared by the teacher and of a 30 to 50 minute teaching demonstration. Each teacher is observed on three separate occasions by three different trained observers. Observers complete an observation sheet by recording 51 dichotomous decisions and writing evidence for each of these.

Development of the APT Instrument began with the identification of the skills and behaviors considered essential for minimally competent beginning teachers in South Carolina. In September, 1980, every South Carolina school district and institution of higher education received a request to return their currently used teacher evaluation forms. Items from these teacher evaluation forms and other instruments in national use were collapsed and compiled to produce a survey listing 70 teaching skills. Over 40,000 surveys were distributed to educators in South Carolina. Respondents were asked which skills they considered essential, observable,and relevant for the minimally competent beginning teacher.

Responses were received from over 19,000 educators and results were analyzed. The 26 statements considered most essential and ranked highest in relevance(almost all were considered observable) were clustered into six performance dimensions. Eight to ten observation statements were written as indicators of these performance dimensions. Fourteen persons selected for their experience in research and measurement, teacher education, public school education, and teacher evaluation

reviewed the items, and revisions were made. The instrument was again reviewed and revised by 65 participants in a pilot training session conducted to train observers in February 1981.

Empirical data, narrative comments, and suggestions collected during the pilot study were used to again revise the instrument. Along with the written comments on items and procedures, three sets of observational data for each of 137 teachers observed were collected. Using these data, a factor analysis of the 51 items(observational statements) was completed. From the rotated factor analysis and from a logical review of the items, the 51 observational statements were regrouped under five performance dimensions. The revisions of the items at this point were more refinements than substantial changes. The instrument underwent further refinement after several trial administrations with observers using videotaped teaching performances. Review and revision of the instrument continued during the first phase of training for the field test with the aid and expertise of the 27 participants in the training session. The field study instrument studied here is the result of those efforts.

In August and September of 1981 approximately 3000 school principals, experienced teachers, district office supervisors, college faculty student teacher supervisors, and cooperating classroom teachers were trained to use the APT instrument. All beginning and student teachers in the state were given a two-hour orientation in the APT procedures and 3 observations were scheduled for each during October and November.

The Samples

Two samples were used for the field study in order to test the reliability and validity of the APT Instrument. One of the samples was composed of 36 classroom teachers who were selected to be videotaped during their observations. The lesson plans prepared by these teachers and their videotaped instructional

presentations were shown to 60 expert teacher evaluators. The 60 evaluators, divided into six groups by regional location around the state, included superintendents, personnel directors, principals, staff development coordinators, and teacher educators from institutions of higher education. Based only on what could be observed in the plans or the videotapes, they were asked to classify the teachers into one of three groups: (1) those they would hire, (2) those they might consider as alternates if no others were available, and (3) those they would not hire. Their judgments were to be made by whatever criteria they deemed important and were to be independent of the APT criteria. Of the 36 teachers, 17 were classified as hireable, 12 as alternates, and 7 as not hireable. This group of teachers was called the known sample.

The second sample of teachers used in the field study was all of the beginning teachers in 81 of the state's 92 school districts and all of the student teachers doing their practice teaching in the fall of 1981 in 27 of the state's 29 teacher preparation institutions. Of the total 1576 teachers who were each observed three times, there were 1134 first-year teachers and 442 student teachers.

Objectivity

Using 34 of the teachers in the known sample, 17 observers made three APT observations on each teacher with a single lesson and videotape for each one. (During the actual assessment the teacher is observed on three separate occasions.) The agreement of observation ratings on all 51 items was computed. Out of a possible agreement among the first, second, and third observations on 1734 items (51 items on 34 teachers). 1305(75.3%) were perfect. That is, all three observers agreed on the demonstration or lack of demonstration of the skill or behavior. Observers were randomly assigned to one of three groups to compare the overall ratings made in the first, second, and third observations. Significant correlation coefficients($p<.001$) were found for the first and second observations (.668),for

the first and third observation(.557), and for the second and third observations (.676).

Reliability

In Table 1 the intercorrelation coefficients between performance dimensions and with total score are presented. Each performance dimension is significantly correlated with the total instrument, however, none of them achieve significant correlation with each other. Measures of multiple abilities in the APT appear to exist.

Table 1. Correlation coefficients (and significance levels) of performance dimensions and APT total. (N=36)

	PD 1	PD 2	PD 3	PD 4	PD 5	APT Total
PD 1	—	.24810 (.1446)	.16589 (.3336)	.13367 (.4370)	.20462 (.2271)	.58451 (.0002)
PD 2		—	.28252 (.0950)	.16855 (.3258)	.23422 (.1691)	.65195 (.0001)
PD 3			—	-.10094 (.9495)	-.02427 (.8883)	.53489 (.0008)
PD 4				—	.11420 (.5072)	.38917 (.0190)
PD 5					—	.63397 (.0001)

The internal consistency of the instrument was determined with the Kuder-Richardson formula 20. Using the data gathered on the field study teachers, the KR-20 statistic of .86 was computed. Table 2 illustrates the coefficients calculated for each performance dimension.

Table 2. Kuder-Richardson formula 20 analysis of performance dimensions and overall total on APT. (N=1603)

PD 1	.58
PD 2	.53
PD 3	.77
PD 4	.63
PD 5	.62
APT Total	.86

Validity

In order to determine the concurrent validity of the APT Instrument the expert judgments made of the known sample were used as external criteria. Through the classifications of the teaching demonstrations(hire, alternate, not hire), an independent assessment for comparison to each performance dimension could be made. Using an analysis of variance procedure with contrasts, the APT total and four of the five performance dimensions were found to discriminate by classification in the known sample just as the expert panels had. Only Performance Dimension 1 failed to meet significance tests for contrasts to discriminate between hireable and not hireable teachers. Table 3 presents these data.

Table 3. Results of analysis of variance on APT performance dimensions and total by external criteria (N=36)

	Degrees of Freedom	F value	p
PD 1	2,33	1.38	.2666
PD 2	2,33	7.69	.0018
PD 3	2,33	6.41	.0045
PD 4	2,33	4.46	.0194
PD 5	2,33	5.95	.0062
APT total	2,33	9.63	.0005

Among the many analyses of data from the field study, a factor analysis was conducted to determine the items loading on the various factors and the magnitude of the loadings. Data collected from the sum of three observations for the 1576 teachers in the field study sample were used. Five factors were retained using the varimax rotated factor pattern. Results are presented in Table 4.

The information found in the factor analysis was used to identify performance dimensions that should be examined further in the revision process. Four items in the field study edition of the APT were moved to different performance dimensions following this review.

Nine of the eleven items in the field study edition of PD 3 loaded highly on factor 1 with loadings of .52, .49, .77, .74, .41, .44, .47, .33 and .31. Performance Dimension 2b was moved to PD 3 as a result of logical considerations and the strong loading on factor 1. The factor analysis called for further examination of PD 3b which has a loading .18 with factor 1. This item was subsequently moved to another performance dimension.

Table 4. Five factor loadings of 51 items from APT instrument.
(N=1576 observations)

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
PD 1a.	0.06613	0.18793	0.06636	0.01705	0.37809
PD 1b.	0.04464	-0.02848	-0.00931	0.19441	0.41775
PD 1c.	-0.01365	0.13671	0.04304	0.10941	0.46046
PD 1d.	-0.00077	0.23572	-0.07873	0.29008	0.32210
PD 1e.	0.06428	0.14540	0.09215	0.11635	0.37441
PD 1f.	0.06984	0.79686	0.04735	-0.01271	0.18845
PD 1g.	0.05738	0.23240	0.15254	-0.10893	0.53906
PD 1h.	0.05326	0.17416	0.14057	-0.09411	0.50353
PD 2a	0.24705	0.01259	0.07141	0.16970	0.26439
PD 2b.	0.52481	0.09500	0.11611	0.21973	0.02346
PD 2c.	0.06646	-0.02057	-0.04714	0.29905	0.31399
PD 2d.	-0.00653	0.33732	0.44178	0.08328	0.15621
PD 2e.	0.01523	0.14061	0.23376	0.46368	0.06694
PD 2f.	0.07630	0.61782	0.03711	0.13973	0.11201
PD 2g.	0.12000	-0.04688	-0.10190	0.32495	0.24596
PD 2h.	0.06327	0.22114	-0.04498	0.47379	0.11015
PD 2i.	0.15972	-0.07327	0.06521	0.39270	0.12004
PD 2j.	0.12884	0.01660	0.10558	0.51483	0.07712
PD 3a.	0.52087	-0.06070	0.08348	0.08966	0.07112
PD 3b.	0.18718	0.15251	0.11376	0.50886	-0.00385
PD 3c.	0.49375	0.04975	0.10062	0.34755	0.06272
PD 3d.	0.76824	0.01535	0.05826	-0.05770	0.13402
PD 3e.	0.73581	0.04282	0.08675	-0.04141	0.06612
PD 3f.	0.41301	0.20328	0.00077	0.06021	-0.04013
PD 3g.	0.09299	0.02066	0.16168	0.26007	0.13090
PD 3h.	0.43888	0.17935	0.08124	0.13614	0.07143
PD 3i.	0.46731	0.13984	0.11965	0.20474	0.04653
PD 3j.	0.33371	-0.08104	0.05902	0.07219	0.28480
PD 3k.	0.30889	-0.14918	0.00731	0.21315	0.20872
PD 4a.	0.24748	-0.00285	0.00258	0.12241	0.14148
PD 4b.	0.08037	-0.02889	0.28697	0.15063	0.17620
PD 4c.	0.23439	-0.02604	0.02498	0.36814	0.16848
PD 4d.	0.22795	0.01475	0.17197	0.45522	0.02027
PD 4e.	0.27352	-0.00444	0.10082	0.35283	0.22384
PD 4f.	0.01416	-0.03818	0.36185	0.25047	0.05572
PD 4g.	0.00949	0.04916	0.05107	0.41328	0.07995
PD 4h.	0.08105	-0.01017	0.05051	0.16314	0.20492
PD 4i.	0.05102	-0.00652	0.02570	0.07620	0.40110
PD 4j.	0.13184	-0.07162	0.15381	0.12928	0.32335
PD 4k	0.21877	-0.14025	0.18475	0.11957	0.13054
PD 5a.	0.14113	0.80489	0.05429	0.02921	0.14738
PD 5b.	0.26663	0.12998	0.36471	0.28188	0.02967
PD 5c.	0.30730	-0.11775	0.12207	0.09757	0.38312
PD 5d.	0.07571	0.03101	0.43040	0.22779	0.07113
PD 5e.	0.01909	0.08635	0.62496	-0.09984	0.08923
PD 5f.	0.21993	-0.03411	0.26787	0.21912	0.03306
PD 5g.	0.05895	0.04391	0.48537	0.12220	0.03959
PD 5h.	0.03721	-0.05378	0.55608	-0.08947	0.19708
PD 5i.	0.11952	0.11453	0.53526	0.24615	-0.06363
PD 5j.	0.01787	-0.05787	0.04866	0.34356	0.08370
PD 5k.	0.12576	-0.05029	0.52738	-0.07653	0.00709

The magnitude of the loading of PD 4a was not extremely strong on any of the five factors. Additional logical analysis of this item indicated the necessity for placing this item on the second performance dimension.

Comments from field study observers and teachers observed indicated that PD 5a appeared to be an instructional dimension rather than an attitude dimension. The factor analysis confirmed the observation that PD 5a should not remain on PD 5 attitude. This item was moved to the second performance dimension(instruction) in the latest revision of the APT.

The factor structure shows that several items from PD 2 and PD 4 load on the 5th factor which is the planning dimension. An inspection of PD 4h, 4i, 4j, and 2c reveals that the planning sheet is considered in the rating of the items.

The five factors presented in Table 4 account for 28% of the total instrument variance. Clearly, there is no prominent first factor. The factor analysis confirms the multidimensionality of the APT Instrument. The hypothesized five dimensions are not confirmed perfectly by the factor analysis but the logical analysis combined with the factor analysis strongly substantiates the performance dimension structure of the APT.

In addition to the classical item analysis procedures, latent trait analysis was used to examine the teacher performance data. In this part of the study the one-parameter latent trait model is applied to the APT Field Study Instrument. The one-parameter latent trait model is commonly referred to as the Rasch model.

The 2 hypotheses tested in the Rasch model are that a single characteristic of the persons tested determines this response and that a single characteristic of the items determines the manner in which these persons respond to them. Ability scores for persons being tested and difficulty values for each item are estimated and evaluated for fit to the model.

The first question examined is whether the APT Instrument as a whole fits the Rasch model and thus defines a single unidimensional latent trait. To explore this problem Rasch calibrations of the 51 items on the APT are performed and examined separately for the first, second and third observations of approximately 1500 teachers. Then, the item difficulty estimates from the three separate calibrations are compared to test the hypothesis that the difficulty estimates are invariant.

The Rasch analysis of the 51 items reveals an extremely high degree of fit to the model on all three observational occasions. The largest between group fit statistic for the first observations was 2.80 for observation statement PD 5a. For the second observations, the same observation statement had a between group fit of 4.58 while all other items had fit statistics lower that 4.00. The largest fit statistics for the third set were 4.74 and 4.34 observation statement PD 4i and Pdlf, respectively. The rest of the items had fit statistics of less than 4.00.

Correlations between the estimates of item difficulties for the three observations are shown in Table 5.

Table 5. Item Difficulty Intercorrelations and Significance Levels (N=51)

	Diff 1	Diff 2	Diff 3	Diff M
Diff 1	1.00000 0.0000	0.98770 0.0001	0.98612 0.0001	0.99606 0.0001
Diff 2	0.98770 0.0001	1.00000 0.0000	0.98327 0.0001	0.99514 0.0001
Diff 3	0.98612 0.0001	0.98327 0.0001	1.00000 0.0000	0.99446 0.0001
Diff M	0.99606 0.0001	0.99514 0.0001	0.99446 0.0001	1.00000 0.0000

These correlations indicate a high degree of stability in the difficulty estimates.

The high correlations coefficients support the assertion that the difficulty estimates are invariant across separate observational occasions by different observers.

Examination of pair-wise regressions of each set of item difficulties provides further evidence of the invariance of the difficulty estimates. The y-intercepts and slopes presented in Table 6 approach 0 and 1, respectively, and indicate that the difficulty estimates are invariant across the 3 occasion.

Table 6. SUMMARY OF PAIR-WISE
Regression Analysis

Regression Pair	y-intercept	slope
1-2	.00007	0.982
1-3	.00009	1.006
2-1	.00007	0.994
2-3	.00001	1.009
3-1	.00009	0.966
3-2	.00001	0.957
1-Mean	.00001	1.001
2-Mean	.00002	1.010
3-Mean	.00002	0.984

The second question examined is whether the performance dimensions analyzed separately fit the Rasch model. These analyses are performed for data collected only on the first observations for each teacher. In Table 7 the between group fit statistics are shown for each performance dimension.

Table 7. Item Fit Statistics
for Separate Performance Dimensions

	PD 1	PD 2	PD 3	PD 4	PD 5
a.	3.41	2.58	0.56	1.15	5.49
b.	2.73	2.39	0.37	.83	2.63
c.	2.89	1.45	1.78	.65	1.35
d.	2.87	2.54	2.38	2.72	3.33
e.	3.03	2.00	4.32	1.20	4.46
f.	2.05	3.72	1.92	1.31	1.43
g.	5.10	1.01	4.50	2.23	2.81
h.	2.97	3.53	0.69	1.19	2.34
i.	-	1.28	0.81	1.75	3.49
j.	-	1.87	0.39	1.92	0.15
k.	-	-	0.52	0.96	3.21

Given the large sample size and the length of these scales, the test of fit is extremely powerful. Each of the five performance dimensions reveals a high degree of fit to the model. Most of the items have fit statistics of less than 3. The largest between group fit statistic for any of the performance dimensions is 5.49. The high degree of fit to the model supports the use of the performance dimension as separate unidimensional scales.

Standards

A final area of Analysis is provided here concerning standards. The standards used in this study were tentatively set based on a limited sample in the pilot testing. Although it is premature to conjecture what standards will be set next spring, analysis of the data may indicate the usefulness of the APT Instrument in its present form.

In the known sample 17 of the 36 teachers were determined by the external criteria to be hireable and 7 were not hireable. If such distinctions were to be maintained by the APT Instrument, the criterion line would divide the group into

the same classifications. Table 8 indicates the number of false negative and false positive decisions that would be made using the tenative APT standards from last spring. The overall passing percentage of the 36 in the known sample is listed as well.

Table 8. Known sample results if computed by tentative standards (Hire=17, Alternate=12, Not Hire=7)

	False Negatives	False Positives	Total Percentage Passing
PD 1	1	4	77.8
PD 2	2	2	72.2
PD 3	0	4	86.1
PD 4	2	4	83.3
PD 5	0	3	75.0

From the table above the performance dimension tentative standards appear to be similarly set across all five with a range of passing rates from 72% to 86%. The error rate for false negative decisions(hireable teachers who did not pass) is quite low. The frequency of false positive decisions(unhireable teachers passing) is close to 50%. Final standard setting could lower the number of false positive decisions by raising the standard, but this action would need to be examined in light of the potential increase in false negative decisions and the total passing rate.

The field study data were analyzed to determine the proportions passing based on the tentative standards. In addition to the 1576 student and beginning teachers, a small group of 27 experienced teachers was included. For this total sample of 1603 teachers, a total of 9.8% would not have passed if the tentative standards had been used for employment decisions. Table 9 identifies the performance dimensions and the frequencies with which the tentative standards were met.

Table 9.. Frequencies of passing patterns in APT field test using tentative standards. (N=1603)

Passing Combinations						Cumulative		Cumulative
PD 1	PD 2	PD 3	PD 4	PD 5	Frequency	Frequency	Percentage	Percentage
N	N	N	N	N	6	6	0.374	0.374
N	N	N	N	Y	2	8	0.125	0.499
N	N	N	Y	Y	5	13	0.312	0.811
N	N	Y	N	Y	1	14	0.062	0.873
N	N	Y	Y	Y	5	19	0.312	1.185
N	Y	N	N	Y	1	20	0.062	1.248
N	Y	N	Y	Y	5	25	0.312	1.560
N	Y	Y	N	Y	1	26	0.062	1.622
N	Y	Y	Y	Y	28	54	1.747	3.369
Y	N	N	N	N	2	56	0.125	3.493
Y	N	N	N	Y	11	67	0.686	4.180
Y	N	N	Y	N	2	69	0.125	4.304
Y	N	N	Y	Y	6	75	0.374	4.679
Y	N	Y	N	N	1	76	0.062	4.741
Y	N	Y	N	Y	1	77	0.062	4.803
Y	N	Y	Y	N	2	79	0.125	4.928
Y	N	Y	Y	Y	20	99	1.248	6.176
Y	Y	N	N	N	1	100	0.062	6.238
Y	Y	N	N	Y	4	104	0.250	6.488
Y	Y	N	Y	Y	31	135	1.934	8.422
Y	Y	Y	N	Y	20	155	1.248	9.669
Y	Y	Y	Y	N	2	157	0.125	9.794
Y	Y	Y	Y	Y	1446	1603	90.206	100.000

From the same data Table 10 indicates the performance dimensions that appeared to present the most difficulty if the tentative standards had been applied.

Table 10. Frequencies of passing rates in APT field test using tentative standards (N=1603)

	Frequency	Percentage
PD 1		
No	54	3.369
Yes	1549	96.631
PD 2		
No	64	3.993
Yes	1539	96.007
PD 3		
No	76	4.741
Yes	1527	95.259
PD 4		
No	51	3.182
Yes	1552	96.818
PD 5		
No	16	0.998
Yes	1587	99.002

Summary

A teacher performance evaluation instrument called the Assessments of Performance in Teaching is being developed in South Carolina. Interim data analyses from the field test upon which decision for revisions are to be made appear very promising. A known ability sample of 36 teachers and a field study sample of 1603 beginning and student teachers were used. Objectivity has been substantiated using three observers with the same teaching demonstration. Internal consistency is high and performance dimension correlations with the total instrument score are all significant. The APT Instrument overall appears to perform the same classification of teacher performance that expert panels do. One of the five performance dimensions did not make the same classification of teacher performance made by the external panel of expert judges. The other four performance dimensions demonstrate strong concurrent validity. The construct validity of the APT is particularly impressive as a multidimensional assessment of teacher skills and behaviors. Yet, a latent trait analysis of these data suggests an overall unidimensional series. The tentative standards used for research purposes indicate that approximately 10% of the teachers in this sample would not be considered minimally competent. These findings will be used to design the final version of the APT to be implemented in July 1982.